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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/309,361	05/11/1999	LEE J. BURROWS	NUFO-002	7398

7590

05/08/2003

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EXAMINER

VINH, LAN

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 05/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/309,361	Applicant(s) BURROWS, LEE J.	
	Examiner Lan Vinh	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-13, 19-22, 26-35, 37-57, 59-61 and 63-70 is/are pending in the application.
- 4a) Of the above claim(s) 19-21 and 26 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9, 11-13, 35, 37-43, 45-48, 53-56, 66 and 68 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-8, 22, 27, 30-34, 44, 49-52 and 57, 59-61, 63-65, 67, 69, 70 is/are rejected.
- 7) ☒ Claim(s) 3-4, 28-29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5-8, 22, 27, 30-34, 44, 49-52, 57, 59-61, 63-65, 67, 69, 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (US 5,442,719) in view of Stoll (US 5,902,519)

Chang discloses a method for making electro-optic lithium niobate waveguides.

This method comprises the steps of:

heating/annealing the lithium niobate/lithium tantalate waveguide/structure from an ambient temperature to 1050⁰ C (col 3, lines 8-10), encompasses the claimed temperature range from about 150⁰ C and less than 400⁰ C as recited in claims 57 and 61, in a closed chamber while oxygen was continuously delivered to the chamber (col 3, lines 6-8). Since Chang discloses performing the heating step in a sealed chamber and Chang is also silent about the presence of H₂O in the chamber, Chang's heating step reads on heating the lithium niobate/lithium tantalate structure in a sealed oxygen gas atmosphere substantially lacking of H₂O to within a temperature range from 150⁰C and less than 400⁰ C

pressurizing the chamber in the presence of oxygen at about atmospheric pressure/ambient atmospheric pressure (col 1, lines 59-60)

holding the temperature and pressure of the chamber for about 7 hours (col 3, lines 12-13) reads on maintaining temperature and pressure for an anneal period

allowing the temperature of the chamber to fall/ cooling the chamber to 20⁰ C/room temperature (col 3, lines 14-15)

Unlike the instant claimed inventions as per claims 1, 22, 57, 61, Chang does not specifically disclose the step of pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure.

However, Stoll discloses a process for oxidizing lithium niobate comprises the step of pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure (10-100 atmospheres) (col 31-33)

Since both Chang and Stoll are concerned with heating lithium niobate in an oxygen atmosphere in a sealed chamber, one skilled in the art would have found it obvious to modify Chang 's method by pressuring the pure oxygen gas in the sealed chamber to exceed ambient atmospheric pressure as per Stoll because Stoll states that large lithium niobate crystal will necessarily require proportionately greater pressure of oxygen (col 4, lines 33-35)

Regarding claims 2, 27, Chang discloses placing lithium niobate/lithium tantalate powder into the chamber with the lithium niobate wafer/structure (col 3, lines 4-6).

Since Chang teaches the same method using the same material as the claimed invention, one skilled in the art would have found it obvious that Chang step of placing lithium niobate powder into the chamber with the lithium niobate wafer/structure would have retarded outgassing of lithium oxide from the lithium niobate wafer.

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Regarding claims 5, 32, although Chang as modified by Stoll disclose pressurizing the oxygen above ambient atmospheric pressure, Chang and Stoll do not disclose the specific claimed pressure. However, one skilled in the art would have found it obvious to adjust the pressure/process variable through routine experimentation to obtain the best result. It has been held that the discovery of an optimum value for result effective variables is within the purview of routine experimentation by the person of ordinary skill in the art. In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980)

Regarding claims 6, 30, 49-52, 59, 60, 63, 64, Chang also discloses raising the temperature in the chamber from ambient/room temperature to about 1050°C (col 3, lines 8-10), which encompasses the claimed range of $150\text{-}900^{\circ}\text{C}$, $150\text{-}600^{\circ}\text{C}$, from about 150°C and less than 400°C

The limitations of claims 34, 44 (lithium niobate/lithium tantalate waveguide structure) has been discussed above.

Regarding claims 7, 31, Chang does not disclose cooling the lithium niobate within a range of $0.5\text{-}40^{\circ}\text{C}$ per minute although Chang discloses the temperature was allowed to fall rapidly. However, Stoll discloses cooling the lithium niobate at a rate not to exceed 50°C per minute (col 4, lines 46-48). One skilled in the art would have found it obvious to modify Chang cooling step using Stoll's teaching since Stoll teaches that such cooling rate is necessary to prevent formation of crack within the crystal (col 4, lines 49-51)

Regarding claims 8, 33, Chang does not disclose heating the lithium niobate within a range of $0.5\text{-}12^{\circ}\text{C}$ per minute although Chang discloses raising the temperature at 20°

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C per minute. However, Stoll also discloses heating the lithium niobate at a rate not to exceed 50° C per minute (col 4, lines 36-38). One skilled in the art would have found it obvious to modify Chang heating step using Stoll's teaching since Stoll teaches that such controlled rate of heating is necessary to prevent formation of crack within the crystal (col 4, lines 39-41)

Regarding claims 65, 67, 69, 70, Chang discloses performing the heating step in a closed/sealed chamber containing oxygen (col 3, lines 4-6), which reads on the sealed oxygen gas is a pure oxygen gas atmosphere.

Allowable Subject Matter

3. Claims 9, 11-13, 35, 37-39, 40-43, 45-48, 53-56, 66, 68 are allowed.

Claims 3-4, 28-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

The applicants have presented persuasive argument that the cited prior art of record fails to disclose the step of separating the space including the lithium niobate powder from the lithium niobate structure with an interface porous to lithium oxide gas outgassed from the lithium niobate powder, the interface being substantially without porosity to the lithium niobate powder. Although the closest prior art of Chen discloses the step of wrapping/separating the lithium niobate structure from the lithium niobate powder, Chen also discloses that wrapping/separating the lithium niobate structure from

the lithium niobate powder reduces the desired change in the refractive index, indicating a very low reaction rate/slow process. Thus, one skilled in the art would have not found it obvious to incorporate Chen teaching into Chang and Stoll process.

Response to Arguments

4. Applicant's argument filed on 2/3/2003 have been fully considered but they are not persuasive

The argument that Chang neither teaches that the gas is lacking in H₂O as claimed, nor suggests any motivation to avoid H₂O in the annealing gas is unpersuasive because as recited in col 3, lines 4-7 of Chang, Chang discloses using an annealing gas of oxygen in a closed chamber and Chang is silent about the presence of H₂O in the chamber. Using a gas in a closed chamber as taught by Chang certainly reads on the gas is lacking in H₂O as claimed.

It is also argued that Chang teaches away from the claimed invention by intentionally introducing proton whereas the claimed invention exclude protons from the process. This argument does not commensurate with the scope of the claims because the independent claims do not require that proton is excluded from the process. Thus, the examiner asserts that Chang does not teach away from the claimed invention.

In response to applicant's argument that there is no suggestion to combine the references of Chang and Stoll because Stoll does not suggest modifying a system working at an atmospheric pressure (Chang) to a pressurized system, the examiner recognizes that obviousness can only be established by combining or modifying the

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teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, since Stoll teaches that lithium niobate crystal that is heated in oxygen atmosphere in a chamber requires greater pressure of oxygen, one skilled in the art would have found it obvious to modify Chang's oxygen pressure in order to produce the claimed invention.

For the above reasons, the examiner maintains the rejection of claims 1-2, 5-8, 22, 27, 30-34, 44, 49-52, 57, 58-61, 63-65, 67, 69, 70 under 35 USC 103(a) based on Chang and Stoll.

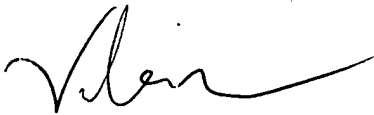
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Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.



LV
May 2, 2003